GPM Ground Validation Advanced Microwave Precipitation Radiometer (AMPR) IPHEx

Notice: The IPHEX Advanced Microwave Precipitation Radiometer (AMPR) data were updated on June 30, 2015 to Version 2. More information can be found *here*

Introduction

The GPM Ground Validation Advanced Microwave Precipitation Radiometer (AMPR) IPHEx dataset was acquired by the AMPR instrument flown aboard the high altitude ER-2 aircraft during the IPHEx field campaign in North Carolina from May 1, 2014 through June 14, 2014. These files include the Level 2B calibrated and georeferenced brightness temperature for the four AMPR-observed frequencies (10, 19, 37, 85 GHz). These data are archived in a netCDF-4 format that contains the calibrated brightness temperatures in addition to ER-2 aircraft navigation and instrument scene georectification variables. A set of Python software has been developed for reading, plotting, and providing some additional analysis capabilities. The AMPR instrument is managed by NASA Marshall Space Flight Center.

Citation

The following example shows how to cite the use of this dataset in a publication. For more information, please see our *Citing GHRC DAAC and Data* page.

Lang, T., Roberts, J., and P. Meyer. DATE. GPM Ground Validation Advanced Microwave Precipitation Radiometer (AMPR) IPHEx [indicate subset used]. Dataset available online [http://ghrc.nsstc.nasa.gov/] from the NASA EOSDIS Global Hydrology Resource Center Distributed Active Archive Center, Huntsville, Alabama, U.S.A. doi: http://dx.doi.org/

Campaign

The Global Precipitation Measurement (GPM) mission Ground Validation (GV) campaign used a variety of methods for validation of GPM satellite constellation measurements prior to launch of the GPM Core Satellite, which launched on February 27th, 2014. The validation effort included numerous GPM-specific and joint-agency/international external field campaigns, using state of the art cloud and precipitation observational infrastructure (polarimetric radars, profilers, rain gauges, disdrometers). Surface rainfall was measured by very dense rain gauge and disdrometer networks at various field campaign sites. These field campaigns accounted for the majority of the effort and resources expended by Global Precipitation Measurement (GPM) mission Ground Validation (GV). More information about the GPM mission is available here *http://pmm.nasa.gov/GPM*.

The GPM Integrated Precipitation and Hydrology Experiment (IPHEx) was held in North Carolina during the months of April-June 2014. The goal of IPHEx was to characterize warm season orographic precipitation regimes and the relationship between precipitation regimes and hydrologic processes in regions of complex terrain. The IPHEx campaign was part of the development, evaluation, and improvement of remote-sensing precipitation algorithms in support of the GPM mission through NASA GPM GV field campaign (IPHEX_GVFC) and the evaluation of Quantitative Precipitation Estimation (QPE) products for hydrologic forecasting and water resource applications in the Upper Tennessee, Catawba-Santee, Yadkin-Pee Dee and Savannah river basins (IPHEX-HAP, H4SE). NOAA Hydrometeorology Testbed (HTM) has synergy with this project. More information about IPHEx is available here *https://ghrc.nsstc.nasa.gov/home/field-campaigns/iphex*.

Instrument Description

The Advanced Microwave Precipitation Radiometer (AMPR) remotely senses passive microwave signatures of geophysical parameters from an airborne platform. The instrument is a low noise system which can provide multi-frequency microwave imagery with high spatial and temporal resolution. AMPR data are collected at a combination of four microwave frequencies (10.7, 19.35, 37.1, and 85.5 GHz) with two orientations each (Vpol-to-Hpol and Hpol-to-Vpol) which are complimentary to current aircraft and satellite instrumentation. The AMPR observations are collected using a cross-track scanning total power microwave radiometer. It has a dual-lens antenna to accommodate two separate feed horns. The horn that feeds the three higher frequency channels is a copy of the Special Sensor Microwave/Imager (SSM/I) space borne multi-frequency feed horn currently flying aboard the Defense Meteorological

Satellite Program (DMSP) satellites. A separate AMPR feed horn, which was built by the Georgia Technology Research Institute (GTRI), accommodates the 10.7 GHz frequency. These frequencies are best suited to the study of rain systems, but are also useful to studies of other atmospheric, oceanic, and land surface processes. More information about the AMPR instrument is available here *https://weather.msfc.nasa.gov/ampr/*.

The following table lists several of the AMPR performance characteristics.

Characteristic	**85.5GHz**	**37.1GHz**	**19.35GHz**	**10.7GHz**
Bandwidth (MHz)	1400	900	240	100
Integration Time (ms)	50	50	50	50
Horn Type	SSM/I	SSM/I	SSM/I	GTRI
Lens Diameter (inches)	5.3	5.3	5.3	9.7
Beam width (degrees)	1.8	4.2	8.0	8.0
Footprint (km) [@20 km ER-2 alt. 500kts]	0.64	1.48	2.78	2.78
Beam Efficiency (%)	N/A	98.8	98.7	97.8
Cross Polarization (%)	N/A	0.4	1.6	0.2

Investigators

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File Naming Convention

The GPM Ground Validation Advanced Microwave Precipitation Radiometer (AMPR) dataset includes data files in netCDF-4 format. The files are named with the following convention:

IPHEX_AMPR_YYYYMMDD_level2b_v1.nc

Where,

IPHEX = Integrated Precipitation and Hydrology Experiment
AMPR = Advanced Microwave Precipitation Radiometer
YYYYMMDD = year, month, and day of data
level2b = data processing level
v1 = version
.nc = netCDF file format

Data Format

AMPR brightness temperature data files are in netCDF-4 format. Python software has been developed to provide reading, plotting, and some analysis of the Level 2B AMPR data files. This software is capable of reading both the netCDF-4 Level 2B files as well as the older, not deprecated, ASCII-distributed AMPR data files from previous

missions also archived by the GHRC. A GitHub repository of this software, PyAMPR, is available at: *https://github.com/nasa/PyAMPR*.

Contact Information

To order these data or for further information, please contact:

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